

**Research Title:** Effect of Feed Formulation on Growth of Mealworm Reared for Consumption

**Researchers:** Suvarin Bumroongsook(Ph.D., Assoc. Prof.)

Premkamon Nahuanong(M.Sc.)

**Faculty:** Agricultural Technology **Department:** Plant Production Technology

King Mongkut's Institute of Technology Ladkrabang

## ABSTRACT

The studies on effects of 5 feeding formulas: 1) wheat bran, 2) broiler chicken feed mixed soybean meal(3:1), 3) broiler chicken feed mixed soybean meal(1:3), 4) broiler chicken feed mixed soybean meal(1:1) and 5) broiler chicken feed mixed soybean(1:1) on growth and development of mealworm and death rates was conducted for 2 times and each session lasted for 8 weeks. At the eighth week, the results showed that the mealworms raised from the wheat bran formula had maximum weight of 5.34 g. Its body length was 1.63 cm and showed no statistically different among treatments ( $p>0.05$ ). The cost of feed formulas 1-5 on 850 first instar lava of mealworm rearing for 8 weeks was as follows : 83.20, 129.12, 136.32, 132.80 and 132.16 baht, respectively.

The studies indicated that the mealworms fed with feed formula 1 had maximum weight and minimum cost among treatments.

An analysis of the chemical composition of the raw materials in feed formulas for mealworms indicated that wheat bran had moisture content 2.83%, ash 5.47% , phosphorus 1.03%, calcium 0.17% protein 18.72%, fat 3.63%, fiber 9.26% and energy 4,253.10 cal/g. Soybean had moisture content 1.58%, ash 5.57%, phosphorus 0.60%, calcium 0.20%, protein 39.35%, fat 20.14%, fiber 2.98% and energy 5,420.80 cal/g. Broiler chicken feed had moisture content 5.46%, ash 7.03%, phosphorus 0.95%, calcium 0.70%, protein 21.18%, fat 2.84%, fiber 3.54% and energy 4,071.75 cal/g. Soybean meal had moisture content 1.44%, ash 6.94%, phosphorus 0.64%, calcium 0.26%, protein 48.82%, fat 1.06%, fiber 6.27% and energy 4,426.50 cal/g. Carrots had moisture content 4.02%, ash 6.79%, phosphorus 0.23%, calcium 0.26%, protein 7.06%, fat 1.31%, fiber 7.97% and energy 3,786.45 cal /g. It was found that mealworms fed with broiler chicken feed + soybean meal (1:3) had the highest protein of 54.89%. The mealworm from feed formula 1 has the highest energy and calcium at 58.98 cal/g and 0.26%, respectively.

Mealworms raised with feed formula 2 had the highest fat content of 29.88% and the lowest moisture of 2.86%. The fourth formula feed, mealworm had fiber, phosphorus and ash was 7.63, 0.79 and 4.79%, respectively.

Consumer acceptance on mealworm as a protein source was performed by using a questionnaire and a sensory taste test. Mealworm were fed by 2 different formula feeds : feed formula 3 (sample A) and feed formula 1 (sample B). Mealworm snack was produced by deep fried mealworm aged 2 months and then mixed with herbal ingredient. Participants (n=100) recruited were consumers of fried insects and were not allergic to them. These consumers were asked to provide demographic information, level of education, and personal income including consumption behavior and purchase intention. The studies showed that of the panelist tested, 100 consumers, 44% males and 56% females were in the age range of 15-66 years old. The majority were 15-25 years of age 46% had completed college 66% and 57% worked with private sectors. Among the panelists, 35% had an income of 5,000 to 10,000 baht/month. According to consumer behavior and attitude toward insects as food, 50% preferred fried grasshoppers, 60% bought insect snack from the places nearby.

The 2 types of mealworm samples were studied by using a 9 point hedonic scale for sensory evaluation. Means of hedonic rating for sensory attributes and acceptance of mealworm snack samples were evaluated. Consumers rated the overall acceptance of mealworm snack sample A and samples B as like moderately (6.95–6.99). Consumers rated the appearance, color, odor and taste of these two samples as like slightly to like moderately. Moreover, odor, flavor, and taste of samples A and B were not much different. When informed that the crispy fried mealworms were nutritious with high protein and fat, 49% of testers had more product acceptance, 45% had acceptance and 6% didn't not accept. Their purchase intention was high, at 74%. The studies gained information for further development of deep fried mealworm into a truly marketable product.